

Chapter: - Matrix and Determinants

1 marks question

Q1. Find total number of possible matrices of order 3x3 with each entry 2 or 0. Ans. 512.

Q2. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ then find $(A-2I)(A-3I)$. Ans. 0. Q3. Evaluate $\begin{vmatrix} \sin x & \cos x \\ \cos x & \sin x \end{vmatrix}$ When $x = \pi/6$ Ans. $-1/2$.

Q4. If for matrix A, $|A| = 3$, Find $|4A|$, Where matrix A is of order 2x2. Ans. 48

Q5. Construct a 2x3 matrix whose element is given by $a_{ij} = \frac{1}{2}|-3i + j|$ Ans. $\begin{bmatrix} 1 & \frac{1}{2} & 0 \\ \frac{5}{2} & 2 & \frac{3}{2} \end{bmatrix}$

Q6. If $A = \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$ then find x such that $A+A'=I$. Ans. $\pi/3$.

Q7. If $A = \begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew symmetric matrix, find the values of a, b and c. Ans. $-2, 0, -3$,

Q8. If $A = \begin{bmatrix} 3 & 5 \\ 7 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 3 \end{bmatrix}$, then find non-zero matrix such that $AC=BC$. Ans. $\begin{bmatrix} k \\ 2k \end{bmatrix}$, Where k is any real number.

Q9. Solve for x, y such that $x \begin{bmatrix} 2 \\ 1 \end{bmatrix} + y \begin{bmatrix} 3 \\ 5 \end{bmatrix} + \begin{bmatrix} -8 \\ -11 \end{bmatrix} = 0$, Ans. 1, 2 Q10. If $\begin{vmatrix} 2 & x \\ x & 2 \end{vmatrix} = 0$ then find x. Ans. ± 2

Q11. If $\begin{bmatrix} 2x & 3 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 8 \end{bmatrix} = 0$, find the value of x, Ans. $-23/2$.

Q12. The area of a triangle with vertices $(-3,0), (3,0)$ and $(0,k)$ is 9sq. units then find k Ans. 3.

Q13. Show that the points $(a+5, a-4), (a-2, a+3)$ and (a, a) do not lie on straight line.

Q14. Find maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 + \sin x & 1 \\ 1 & 1 & 1 + \cos x \end{vmatrix}$, Ans. $1/2$

Q15. If A is 3x3 matrix, $|\text{adj}A| = 16$, find $|A|$, Ans. ± 4

4/6 marks question

Q16. If $A = \begin{bmatrix} 2 & -1 & 0 \\ 4 & 7 & 8 \\ -3 & 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 & 6 \\ 1 & -8 & 2 \\ -5 & 4 & 7 \end{bmatrix}$, $C = \begin{bmatrix} 0 & 9 & 3 \\ 5 & 8 & 8 \\ -3 & 6 & 3 \end{bmatrix}$, $D = \begin{bmatrix} 2 & -1 & 7 \\ 4 & 1 & 8 \\ 7 & 3 & 0 \end{bmatrix}$, then verify the following

identities:-(i) $A+B=B+A$ (ii) $A+(B+D)=(A+B)+D$ (iii) $(A+C)'=A'+C'$ (iv) $A'+B'=B'+A'$ (v) $(5D)'=5D'$ (vi) $(AB)'=B'A'$.

P.T.O.

(vii) $(A')' = A$ (viii) $((A')')' = A'$ (ix) $AB \neq BA$ (x) $CD \neq DC$ (xi) $(AC)' = C'A'$ (xii) $(BD)' = D'B'$ (xiii) $(A^{-1})' = (A')^{-1}$

(xiv) $(AB)^{-1} = B^{-1}A^{-1}$ (xv) $C^{-1}D^{-1} \neq D^{-1}C^{-1}$

Q17. If $\begin{bmatrix} xy & 4 \\ z+6 & x+y \end{bmatrix} = \begin{bmatrix} 8 & w \\ 0 & 6 \end{bmatrix}$ then find the values of x,y,z,w, Ans. 4,2,-6,-4 or 2,4,-6,-4,

Q18. Express (i) $\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$ (ii) $\begin{bmatrix} 6 & 7 \\ -2 & 1 \end{bmatrix}$ as a sum of symmetric and skew symmetric matrices.

Ans. (i) $\begin{bmatrix} 1 & -3 & 1 \\ -3 & 8 & 9 \\ 1 & 9 & 5 \end{bmatrix} + \begin{bmatrix} 0 & 9 & 9 \\ -9 & 0 & -3 \\ -9 & 3 & 0 \end{bmatrix}$, (ii) $\begin{bmatrix} 6 & 5 \\ 5 & 1 \end{bmatrix} + \begin{bmatrix} 0 & 9 \\ -9 & 0 \end{bmatrix}$.

Q19. By ET find Inverse of (i) $\begin{bmatrix} 2 & 3 & -3 \\ -1 & -2 & 2 \\ 1 & 1 & -1 \end{bmatrix}$ Ans. Does not exist. (ii) $\begin{bmatrix} 4 & 3 \\ 3 & 2 \end{bmatrix}$ Ans. $\begin{bmatrix} -2 & 3 \\ 3 & -4 \end{bmatrix}$

Q20. Using the matrix method solves the following system of linear equations. $x + y + z = 6$, $y + 3z = 11$, $x + z = 2y$, Ans. 1,2,3

Q21. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$ find A^{-1} hence solve the system of following linear equations:-

(i) $x - 2y - 10 = 0$, $2x - y - z - 8 = 0$, $2y - z + 7 = 0$. Ans. 0,-5,-3 (ii) $x + 2y = 3$, $2x + y + 2z = 5$, $y - z = 0$. Ans. 1, 1, 1

Q22. If $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 1 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ find AB and BA hence solve the system of linear equations:-

$Y + 2z = 7$, $x - y = 3$, $2x + 3y + 4z = 17$, Ans. 2,-1,4,

Q23. Using the property of determinant, prove that following

(i) $\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 4+3p+2q \\ 3 & 6+3p & 10+6p+3q \end{vmatrix} = 1$ (ii) $\begin{vmatrix} (a-x)^2 & (a-y)^2 & (a-z)^2 \\ (b-x)^2 & (b-y)^2 & (b-z)^2 \\ (c-x)^2 & (c-y)^2 & (c-z)^2 \end{vmatrix} = 2(a-b)(b-c)(c-a)(x-y)(y-z)(z-x)$

(iii) $\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{vmatrix} = 3(a+b+c)(ab+bc+ca)$.

(iv) $\begin{vmatrix} bc-a^2 & ca-b^2 & ab-c^2 \\ ca-b^2 & ab-c^2 & bc-a^2 \\ ab-c^2 & bc-a^2 & ca-b^2 \end{vmatrix} = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$.

-----Best of Luck-----